

## CPSC 5005 - Data Structures

### Course Information

Course Code: CPSC 5005-02  
Course Name: Data Structures  
# Credits: 3  
Day/Time: T 3:45 PM - 6:25 PM  
Location: Teilhard De Chardin  
Hall, 142 Lecture/Lab

### Instructor Information

Instructor: Matthew Thayer  
Phone: 704-657-6940  
Email: mthayer@seattleu.edu  
Office: SINE 290-13  
Office Hours: MW: 1:00 p.m. - 4:00 p.m.  
(In-Person/Zoom)  
Office Hours: Friday: 1:00p.m. - 4:00 p.m.  
( [ZoomLinks to an external site.](#) ) Tue: 10:00 a.m. - 12:00 p.m.

**\*\*Or by appointment if time  
work for you\*\***

### TA Information

TA: Jou Ho

Email: [jho1@seattleu.edu](mailto:jho1@seattleu.edu)

Office Hours:

TBD

By appointment: please send me a message on Discord/Email to request

TA: Lei Meng

Email: [lmeng2@seattleu.edu](mailto:lmeng2@seattleu.edu)

Office Hours:

TBD

By appointment: please send me a message on Discord/Email to request

## Catalog Description:

Data structures including binary search trees, priority queues, hash tables, and heaps. Recursion, sorting, and run-time analysis using big-O notation.

## Course Topics:

- Introduction to C++
- Code Complexity Analysis
- Recursion
- Binary Search Trees
- Hash Tables
- Heaps and Priority Queues
- Sorting

## Course Learning Outcomes:

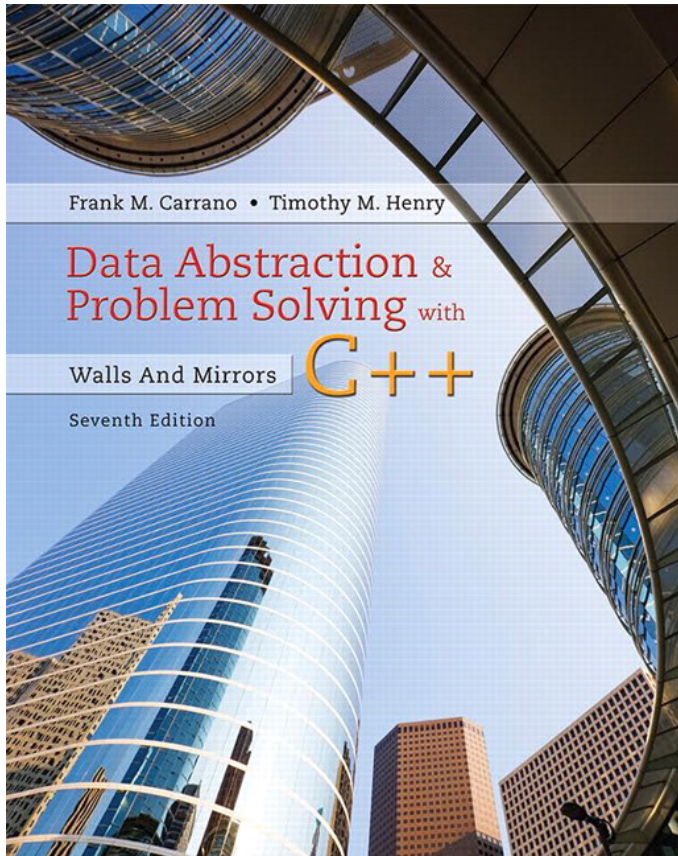
On successful completion of this course (i.e. by passing this course), you will be able to:

- Analyze the runtime performance of code segments and data structure operations using big-O notation.
- Implement recursive solutions to problems, properly identifying base case(s) and recursive relations.
- Implement recursive and non-recursive algorithms to manipulate binary search trees, heaps, and

priority queues; use them appropriately in solving problems.

- Implement algorithms to manipulate hash tables and use them appropriately in solving problems.
- Compare and contrast sorting algorithms, including mergesort and heapsort.

## Textbook:



### Required:

*Data Abstraction & Problem Solving with C++*, 7<sup>th</sup> ed., by Frank Carrano and Timothy Henry, Pearson, 2017.

(ISBN-13: 9780134463971 | ISBN-10: 0134463978)

You can purchase/rent on [Pearson website](#) [Links to an external site.](#) or [SU bookstore](#) [Links to an external site.](#)

### Optional (C++ reference):

*Starting out with C++: From Control Structures through Objects*, 9<sup>th</sup> ed., by Tony Gaddis, Pearson, 2017.

(ISBN-13: 9780134498379 | ISBN-10: 0134498372)

## Important Dates:

Tuesday, September 27

First day of class

September 27	Last day to register, add/drop
November 14th	Last day to withdraw ('W' grade)
Tuesday, November 29	Last day of class
Tuesday, December 6th @ 4:00pm in Chardin 142 - Large Classroom #1	Final Exam Date, Time & Location

Please check [2022-23 academic calendar](#)[Links to an external site.](#) for all dates and holidays.

## Grading Scale & Policy:

Quizzes & Classwork	5%
Labs	20%
Programming Assignments	25%
Midterm Exams(2)	25%
Final Exam	25%

### Final Grade:

Your final grade will be calculated as noted above, however, you must receive at least 70% on the Final Exam to receive a grade of C or above. If your Final Exam grade is below 70%, the best grade you can receive in the course will be a C-.

### Homework Assignments:

All labs and programs are due at the indicated time on the indicated due date. Additionally, labs and programs that do not compile will automatically receive a zero. Segmentation faults and other runtime errors (that stop program execution) will result in an automatic 20% deduction.

If you are unable to complete course requirements because of extenuating circumstances, please notify the instructor on or before the date the assignment is due and provide relevant supporting documentation (e.g. doctor's note, note from counselor).

Programming assignments may have an extra credit option. Extra credit must be completed in a separate file from the main assignment and will not be graded unless the main programming assignment receives at least 85%.

Programs will be graded according to a set of standard criteria, including but not limited to functionality, documentation and style. A rubric detailing the requirements will be posted on the course website with each assignment.

## Quizzes:

Quizzes will be given throughout the course. Quizzes will be scheduled in advance and announced during class and via Canvas. Each quiz is worth 10 points and will cover material that is covered in lectures, readings, or labs.

## Midterm & Final Exams:

There will be two midterm exams and a final exam. The midterm exam dates will be announced at least 2 weeks in advance. The final exam is (tentatively) scheduled for Thursday, December 8th from 6:00-7:50pm. All exams are open-book, open-notes.

## Grading Scale:

The grade breakdown is shown below. Exam and final grades may be adjusted linearly if it seems appropriate.

- A > 93.3%
- A- > 90%
- B+ > 87.7%
- B > 83.3%
- B- > 80%
- C+ > 77.7%
- C > 73.3%
- C- > 70%
- D > 60%
- F Below 60%

## Contact:

**Contact by email is preferred.** Please use good email etiquette - use a proper greeting, include your first and last name in the signature, and **put the course number in the subject of the email**. Expect a 24-hour response time for emails during business days, or the next business day if the email is sent over the weekend. If there is a legitimate emergency, mark your message as urgent in the subject.

## Office hours, tutoring, and email/Discord expectations:

- Feel free to come to office hours, tutoring, or email if you want clarification on the assignment or want to explore a design issue. You may email or send inquiries via Discord.
- Concepts and general approaches may be discussed in the [Discord channel](#)[Links to an external site.](#). Specific design strategies and bugs should be sent via email or Discord DM.

- Tutoring should be focused on CPSC 5005. Do not ask the TA for help on other courses.
- Feel free to discuss CPSC 5005 or general questions regarding the program or other career advice during office hours. Note that advising questions (i.e. courses to take, registration, MSCS program, etc.) should be directed to your academic advisor; you can find this information on [SU OnlineLinks to an external site.](#)

**Follow these steps when you send an email or use Discord to contact the professor:**

1. Succinctly describe what the problem is and what help you are seeking.
2. Describe the incorrect behavior (include screen shots).
3. List what you have done to diagnose it (include supporting info like links, code snapshots, etc.) and who you have already consulted.
4. Explain how your efforts at diagnosis are stuck.
5. Restate what help you are asking for.

**Office hours:**

- Students will be limited to 20 minutes during tutoring and office hours. After the 20 minutes, they will be put in the waiting room and if there is still time remaining, the tutor/instructor will add you back to the meeting.
- You should be able to state the 5 steps above when you see the instructor/tutor. If not, you will be placed in the waiting room.
- Office hours and tutoring will start and end at the times listed on the syllabus. Students who are not able to talk to a tutor/instructor will be asked to come back to office hours/tutoring on another day or make an appointment with the instructor. You can also email your question to the instructor.
- Though the tutor and instructor will check Discord/email occasionally throughout the day, there may be a 24-hour turnaround on your emails/messages.
- The instructor and tutor will stop responding to messages after 5pm and check emails/Discord in the morning.

**A few additional tips:**

- Start on HW early. Design your program and ask general or clarification questions on Discord.
- Look at the syllabus and review lecture videos/book. Try to run and trace the code covered during class.

**Student Expectations:**

### **Workload Expectations:**

As this is a 3-credit class, students should plan to spend 6-8 hours per week outside of class. Depending on the student this number can be more or less.

### **Class Conduct Expectations:**

You are responsible for treating other students with respect and to minimize disruptions to the classroom. All students are welcome in our class, full stop.

### **Class Announcement and Email Expectations:**

All class announcements will be made in class, repeated on Discord, and possibly posted to Canvas. By default, Canvas will instantly send these announcements to your SU email address. If desired, you may change the settings on Canvas to send these announcements to an alternative email address and/or to social media account.

### **Attendance Expectations:**

Class attendance is optional, and purely for the benefit of the student. Students missing a class are responsible for any material assigned or covered in class during their absence. Lecture recordings will be posted to Canvas for those with outside schedule demands. This is an in-person class so you must come to class or watch lecture recordings posted on Canvas.

In accordance with university policy, [incomplete grades \(I\)](#)[Links to an external site.](#) are given if an unexpected extended absence occurs at the end of the quarter due to illness or other serious circumstances beyond the student's control.

### **Homework Help Tips:**

When coding, code small chunks and compile often. If you're having issues with your code, first, add print statements or try debugging. You can also try commenting out portion of your code until you can pinpoint what line(s) of code are causing the issue. If you don't understand a compilation error, Google it! And always try and reference the example code and book.

If you're still having issues, try to attend tutoring or office hours. The TA and I are happy to help you understand the assignment, but will only help you debug the code if you are able to demonstrate confidence in what line(s) of code are causing compilation or logic errors. For example, if function A calls function B, you must demonstrate that function B is behaving correctly (i.e. demonstrate with tests). In addition, provide context and narrow down the issue. Do not send source code files in its entirety; send code snippets that are causing issues and specify what line(s) are problematic.

## **Course & University Policies:**

### **Canceled Class Policy:**

If a class is canceled (likely due to inclement weather or instructor illness/travel), the instructor has the obligation to make up lost class content in an online format.

### **Late Homework Policy:**

Students are granted **two late** "passes" per course, where they can submit an assignment by **11:59pm** the next day with no penalty. For example, if an assignment is due on Tuesday at 11:59pm, you can submit by Wednesday by 11:59pm with no penalty if you have a "pass" remaining. Next day includes weekends, so if an assignment is due on Friday, you can submit with a late pass by Saturday at 11:59pm and if due on Saturday, you can submit with a late pass by Sunday at 11:59pm. Passes **cannot** be used for ICEs, quizzes and exams.

Late passes cannot be doubled up or used together. If a late pass is used and the assignment is not submitted by 11:59pm the next day, the assignment will automatically receive a zero.

After all passes are used, students will receive a zero on any late submissions. Assignments that do not compile will automatically receive a 20% deduction. Assignments that do not follow the submission instructions will receive a zero. Assignments will not be accepted via email.

***This policy exists to relieve student stress and remove any incentive to plagiarize. Students who are able to explain gaps in their understanding make it possible for the instructor to attempt to fill them, where students who choose to plagiarize force the instructor to attempt to guess what students do or don't understand.***

### **Electronic Submission Policy:**

Homework assignments (or portions of homework assignments) will be required to be submitted electronically via Canvas or on CS1. Submission details will be provided in the assignments. While a solution can be submitted multiple times, only the last submission will be graded as previous submissions are overwritten. Be sure to double-check your solutions as assignments will only be graded once after the due date. Any assignments (or portions of homework assignments) that are required to be submitted electronically, must be submitted electronically. Assignments submitted using other means, including email submissions, will not be accepted.

### **Grading Dispute Policy:**

If you feel something was graded incorrectly or a math error occurred when tabulating the total score of an exam or assignment, please contact me. All grading disputes must be sent in writing via email for the benefit of the registrar's office.

### **Health and Safety Protocols:**



In this class, as elsewhere on campus, all of us—students and faculty—must comply with all Seattle University [health and safety protocolsLinks to an external site.](#), including:

- **Face coverings:** Consistent with SU's [COVID-19 Face Covering PolicyLinks to an external site.](#), we (students, faculty and staff) will all wear face coverings that completely cover the nose and mouth when indoors. We will also wear face coverings when we are outdoors and are unable to maintain physical distance of six feet from others;
- **Physical distancing:** We will maintain physical distance of at least six feet (two meters) between individuals in all classrooms and instructional spaces.
- **Assigned seating:** Everyone will sit in assigned seats throughout the academic quarter and I will document that seating plan for the purposes of any needed contact tracing; and
- **Entry and exit:** We will follow protocols for staged entry to and exit from classrooms and instructional spaces.

We are all part of an academic learning community in which care for one another is part of our shared responsibility and commitment that goes to the heart of our Jesuit values. Consequently, all of us need to comply with these protocols. If you do not want to comply with the University's health and safety protocols, then you may attend remotely via Zoom.

### **Support for Students with Disabilities:**

If you have, or think you may have, a disability (including an "invisible" disability such as a learning disability, a chronic health problem, or a mental health condition) that interferes with your performance as a student in this class, you are encouraged to arrange support services and/or accommodations through Disabilities Services staff located in Loyola 100, (206) 296-5740. Disability-based adjustments to course expectations can be arranged only through this process.

### **Religious Accommodations:**

It is the policy of Seattle University to reasonably accommodate students who, due to the observance of religious holidays, expect to be absent or endure a significant hardship during certain days of their academic course or program. Please see, [Policy on Religious Accommodations for StudentsLinks to an external site.](#).

### **Academic Integrity Policy:**

Students, unless specifically stated otherwise, are required to do all work in this course individually. Submitted work must be original work done by the student. However, you may use class material without citation. Class material includes information that was presented in class, discussed during office hours, that appears in the textbook or lecture notes, or was provided by me (or any guest instructor). The use of external sources such as other books, open source, or the Internet must be approved by the instructor and must be cited before submitting the assignment.

In general, it's ok to verbally discuss concepts and general approaches/strategies with other students, tutors, and the instructor. It's also ok to discuss bugs. It's not ok to debug someone else's code, share code, or work on coding together. It's also not ok to tell someone how to solve a problem (and do not ask this of other students or tutors).

If you are in doubt whether a particular activity may be considered cheating, ask the instructor. In addition, you are encouraged to consult the Academic Integrity Tutorial available on SU Online ([https://www.seattleu.edu/academicintegrity/Links to an external site.](https://www.seattleu.edu/academicintegrity/Links%20to%20an%20external%20site)).

***Any evidence of plagiarism, collaboration, or other cheating will result in a zero*** for all parties concerned for the assignment or exam in question. In addition, all academic integrity violations will be reported according to the Seattle University Academic Integrity Policy. That process may enforce additional penalties and/or disciplinary action. Please consult the [Academic Integrity Policy \(2011-3\)Links to an external site.](#) for further information.

#### **Additional notes on Academic Honesty:**

- Academic Honesty is absolutely essential in order for learning to occur. You are expected to do your own work unless group work is explicitly stated in the assignment directions.
- What's Ok
  - Discuss concepts, general approaches, strategies
  - Discuss bugs
- What's Not Ok
  - Debugging someone else's code
  - Sharing code, homework answers, etc. via email or verbally
  - Telling another student how to solve
- Default policy for cheating: an F for the assignment/course and the incident is reported to the dean's office
- You will be expected to produce and understand all aspects of your work

#### **Academic Policies on the Registrar's Website:**

Be sure that you understand the [Academic Integrity Policy and the Academic Grading Grievance PolicyLinks to an external site.](#), posted on the Registrar's website.

## **Academic Resources:**

My goal is to create a learning environment in which you can be incredibly successful. I will work hard to create and improve the learning environment throughout the quarter based on my own observations of the course and your feedback on what would help you learn more. In return, I ask and encourage you to make the most of this learning opportunity. Please take advantage of the academic support services available to you at

the university. Even if you have had excellent study skills in the past, it is easy to slip into suboptimal habits and these services can help you excel in your studies.

### **Library and Learning Commons**

<http://www.seattleu.edu/learningcommons/Links to an external site.>

### **Learning Assistance Programs**

Learning Assistance Programs provide peer tutoring, facilitated study groups, and learning strategy development through scheduled workshops and individual meetings with a learning specialist.

## **Community & Inclusivity:**

Seattle University has a stated commitment to diversity and inclusivity. In part, this includes an expectation that all members of our campus community treat one another with respect and care in the classroom. Actions or statements which espouse the supremacy of one group of people over another, or which marginalize any group, are not welcome in our classroom. Such attitudes are destructive to both our learning process and our community. All students in this course are welcomed and valued.

Racism, sexism, homophobia, transphobia, and other forms of discrimination have no place on our campus or in our classroom. Our class, like our campus, is one community. We learn together. We work together. And we will respect one another. We teach all students, regardless of background or beliefs. All students are equally welcome and valued. Growth mindset includes our ability to grow together, to learn to be more tolerant, and to become more compassionate. No one is being asked to leave the table. Everyone is being asked to make room at the table, so that everyone has a seat and a fair chance.

If you find that anything in our class is failing to live up to these principles (including if you feel that I myself have failed to live up to them), I encourage you to bring this issue up, either to me, to the computer science department chair, your advisor, or another faculty or staff member you feel comfortable talking with, who could pass on your concerns to myself or my department chair. Alternatively, you can report such incidents through the [Office of Institutional EquityLinks to an external site.](#)